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Predatory Potential of Wall Lizard Hemidactylus Flaviviridis for Some Insect Pest Orders

KEYWORDS

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ABSTRACT *Hemidactulus flaviviridis (Squamata : Gekkonidae) is an important biocontrol agent of several insect pests. Therefore, its biocontrol potential was assessed on the basis of insect pest species predated. During the survey studies, 2014-15 H. flaviviridis was found potential predator of mosquitoes, jassids, moths, beetles and several other insects. Termites and winged ants were also predated by H. flaviviridis at a very large extent during the monsoon period. The order of preference for insects was Hemiptera > Diptera > Coleoptera > Lepidoptera. Predatory insect predation like Neuroptera also been predated by H. flaviviridis.*

INTRODUCTION

Reptiles play a significant role in the ecosystem sustenance as links in food chains, bio-monitors in controlling many pests and also as excellent ecological indicators owing to their high degree of sensitivity to even a minor change in the environment (Roy, 2002). India harbours 518 species of reptiles including 202 species of lizards (Radhakrishnan & Rajmohana, 2012).

Lizards are probably the most easily spotted of all reptiles. There are over 3500 different types of lizards existing in all climates throughout India (Anjum *et al.*, 2013). In many countries, the wall lizard or gecko is a welcome house guest, chasing and eating many irksome insects (Evans & Sanson, 2005; Fisher & Dickman, 1993; Thaczenko *et al.*, 2014; Schyaedla, 2004). They walk the walls and ceilings and live their lives unharmed by peacefully understanding their niche. They are often misunderstood and large numbers of poisoning cases are blamed on this innocent creature for lack of knowledge and exposure. The wall lizard found in most homes in India is not poisonous at all. They don't have any venomous apparatus and just helps in checking insect population. However, only two species namely, *Heloderma suspectum* and *Heloderma hornidum* are poisonous (Beaman *et al.*, 2006). Lizards are versatile and as diverse as their dwellings. They have been around for a very long time with their ancestors having roamed the planet earth long before man. Lizards belong to order squamata of class Reptilia and phylum chordata of Kindom Animalia (Utez, 2010). The wall lizard or the house gecko *Hemidactylus flaviviridis* belongs to the family Gekkonidae of Suborder Gekkotaunuchis second largest family of this suborder. According to Sety and Hansen (2008) in many parts of the world, lizards are considered to be venomous animals, capable of infliching poisonous bites, causing diseases such as leprosy, vitiligo and rendering food poisonous. Egyptians, Mexicans, Malaysians and South Africans also believing that the lizards are poisonous (Evens, 2002). Except above mentioned two species *H. suspectum* and *H. hornidum* rest of the lizards are non poisonous and they have very crushial role in insect pest control. The genus *Hemidactctylus* Oken contain 100 described species. (Boulenger, 1890; Rooii, 1915; Smith, 1935; Roy, 2002; Beaman *et al.*, 2004; Radhakrishnan & Rajmohan, 2012). The genus *Hemidactylus* is distributed over large parts of tropical Asia, Africa, Mediterranean Europe and the America. This genus is represented by additional 24 valid species (Zug *et al.*, 2007). Recently 4 species namely, *H. aaonbaueri* Giri, *H. guiaratensis* Giri *et al.*, *H. satarensis* Giri & Bauer and *H. treutleri* Mahony were described from India (Vetz, 2010).

Now-a-days, pest management through pesticides is not without danger. Infact, pesticides lead serious problems like pest resistance, pest resurgence, secondary pest outbreak, pollutions, health hazards, killing of beneficial organisms, destruction to ecocycles, etc. The above facts clearly indicates that pesticides should not be used in pest management, atleast their use should be minimized. Biological pest control is very good alternative for chemical pest control. As like many Invetebrates and vertebrate predators wall lizard is very potential biocontrol agent of insect pests. However, no attention has been paid on this important biocontrol agent of insect pests. Keeping in view all above facts, the present work was carried out. In past, Sathe & Bhoje (2000), Patil & Sathe (2003), Sathe (1998, 2014, 2015) etc worked on biological control of insect pests.

MATERIALS AND METHODS

The present study was conducted at Panchgaon, R.K. Nagar, Kolhapur and Shivaji University Campus, Kolhapur. Kolhapur is situated between 15° to 17° North latitude and 73° to 74° East latitude with 1200 mm rainfall and temperature range 10°C - 40°C.

On a plan wall, an area of size 5 x 5 sq.ft. was selected for studying predatory potential of wall lizard *H. flaviviridis*. A light source was also provided to the selected area. The observations were taken on the insect diversity and their

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occurrence in the above square and the number of insects predated by *H. flaviviridis* from 9.00 p.m. to 10.00 p.m. at weekly interval during the years 2013 - 2014. Spot observations by one man one hour search method was adopted for occurrence and predation of insect by wall lizard of insects. Insects have been collected with the help of insect net and plastic containers for identification. Identification was made by consulting appropriate literature cited in the references. A single wall lizard was taken into account for observation within 5 x 5 sq.ft. area. Extra wall lizard was driven out of selected area with the help of vaccum sucker. For social insects such as termites and winged ants swarming occurred during the monsoon and their predation by *H. flaviviridis* has been noted by spot observations, specially at evening.

RESULTS

Results are recorded in table 1 and figures 1 to 9 indicated that the orders Hemiptera, Coleoptera, Diptera and Lepidoptera were dominant orders. Hymenoptera and Neuroptera were also in sizable number. However, Isopterans were found occasionally but with a very large number and widely predated by *H. flaviviridis*. Winged termites (Isoptera) were predated during the monsoon period and when the first rain was occurred after the long period of drought. The order of preference of predation of insect orders refer to Hemiptera > Diptera > Coleoptera > Lepidoptera (Table-1). All four insect order were prevalent during the entire period of the year. Maximum predation was noted during the months of August and September. While, predation rate was slowed down during the cold months, November and January. Neuropterans (Lace wings) were also predated by *H. flaviviridis* although they are predators of many insects. In general, soft bodied insects were preferred over hard and large bodied insects by number. However, lepidopterous moths as a large insects were also preferred by the house lizard (Fig. 2).

DISCUSSION

Chittaragi & Hosetti (2014) reported that geckos were best link in controlling mosquitoes and other harmful insects. Similarly, Tkaczenko *et al*. (2014) concluded that mosquito predation by *H. frenatus* is of considerable importance (Tyler, 1961) and showed potential as a mosquito control measure. The predation rate of *H. frenatus* and the gecko *Gehyra dubia* feeding on mosquitoes have been reported by Macleay (1877). The predation rates were relatively high 63 to 109 mosquitoes per day depending on prey density. *H. flaviviridis* was also found feeding on mulberry silk worm larvae in rearing houses of sericulture from Kolhapur region of India (Sathe, 1998). According to Tkaczenko *et al*. (2014) Lepidoptera tended to be preferred by *H. frenatus* and *H. platyurus* while, Coleoptera and Heteroptera were disfavoured. Both above species showed a slight preference towards Culicidae. Softer insects were easier to digest and apart from size this might have influenced a preference towards those insects. Accordingly, Culicides (Culicidae) were not specifically insects compared to others encountered. Stephens and Krebs (1986) says that an individual of any species aims to retrieve most energy while investing the least energy. Based on this optional foraging theory some predictions were that an individual would put more energy in hunting a large prey in comparison to a small prey, an individual would prefer an easy digestible prey over a hard to digest prey since this will cost less energy (Stephens & Krebs, 1986). Several insect vertebrate predators choose their prey based on cuticle thickness or hardness (Fisher & Dickman, 1919, Wetering & Umponstira, 2014). However, *H. frenatus* showed varying preference towards insects (Tyler, 1966; Lepage & Darlington, 2000; Schaedla, 2004). Tyler (1961) reported that the diet of the *H. platyurus* was mainly comprised of Diptera, Lepidoptera and Coleoptera while, Diaz - Perez *et al*., (2012) reported preferred insect orders for the same insect as Hemiptera, Hymenoptera and Coleoptera while, in the present study, *H. flaviviridis* gave preference for predation of insects as Hemiptera > Diptera > Coleoptera > Lepidoptera. The probable reasons might be the availability of preys, easy digestibility and small size of the insects. However, lepidopterans were comparatively large sized than others were also encounted much more by the predatory wall lizard.

Earlier studies have suggested that *H. frenatus* was potential predator of mosquitoes while, our results suggested that *H. flaviviridis* was potential predator of jassids, culicines, Noctuids, Pyralids and spinghid moths and also for several beetles, termites and nuropterans.

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Fig. 3. *Acherontia* **moth**

Fig. 4. Sphingid moth

Fig. 5. Citrus moth

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Fig. 6. Pyralid moth

Fig. 7. Jassid

Fig. 8.*Holotrichia sp.*

Fig.9.Culicid

Table - 1 : Predatory potential of wall lizard *H. flaviviridus* for some insect orders

Insect orders	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May
Lepidoptera	07	10	18	19	17	11	07	05	06	07	06	07
Coleoptera	13	29	27	22	17	12	07	06	07	08	08	08
Hemiptera	15	23	32	28	20	10	10	06	12	11	10	09
Diptera	14	28	28	23	18	09	08	06	15	22	26	27

Fig.2. *H. flaviviridus* predating on Noctuid moth (Lepidoptera)

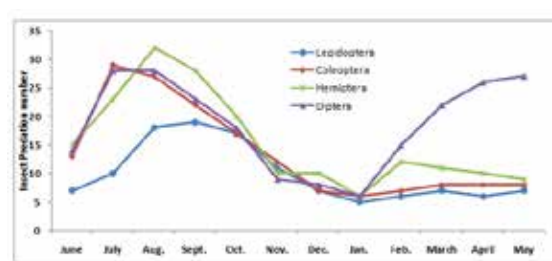

Fig.1. Seasonal insect predatory potential of *H. flaviviridis.*

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